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Air Pollution Control
Annual Report - 1990

PBC Health Department

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AIR POLLUTION CONTROL

ANNUAL REPORT 1990

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DEPARTMENT OF HEALTH AND REHABILITATIVE SERVICES

HRS/PALM BEACH COUNTY PUBLIC HEALTH UNIT

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MESSAGE from the HEALTH DIRECTOR

Dr.Jean M. Malecki
Director of Health

The environment that surrounds us, the air that we breathe, is of vital public health concern. Any strategy for reducing air pollution and improving air quality depends upon public awareness and interest. It is the intent of the HRS / Palm Beach County Public Health Unit to raise such awareness through this annual air program report.

The major air pollutants, carbon monoxide, lead, nitrogen oxides, ozone, particulate matter and sulfur dioxide, can have an adverse impact on our health. The identification and continued monitoring of the sources of air pollution as well as ongoing assessment of total air quality are the foundation for our air pollution control activities.

By informing the residents of Palm Beach County of the area's ambient air quality and those programs that presently address air pollution prevention, the community can gain knowledge on this important issue and thereby support the new challenges that we face in protecting our air quality.

Jean Marie Malecki

Dr. Jean Marie Malecki
Director of Health
HRS / P.B.C.P.H.U.

Table of Contents

Message from the Health Director.

I. Introduction 1
Characteristics of Palm Beach County 2
Organization & Goals 3

II.Major Air Pollutants & Health Effects 3
Carbon Monoxide 4
Lead 4
Nitrogen Oxides 5
Ozone 5
Particulate Matter 6
Sulfur Dioxide 7

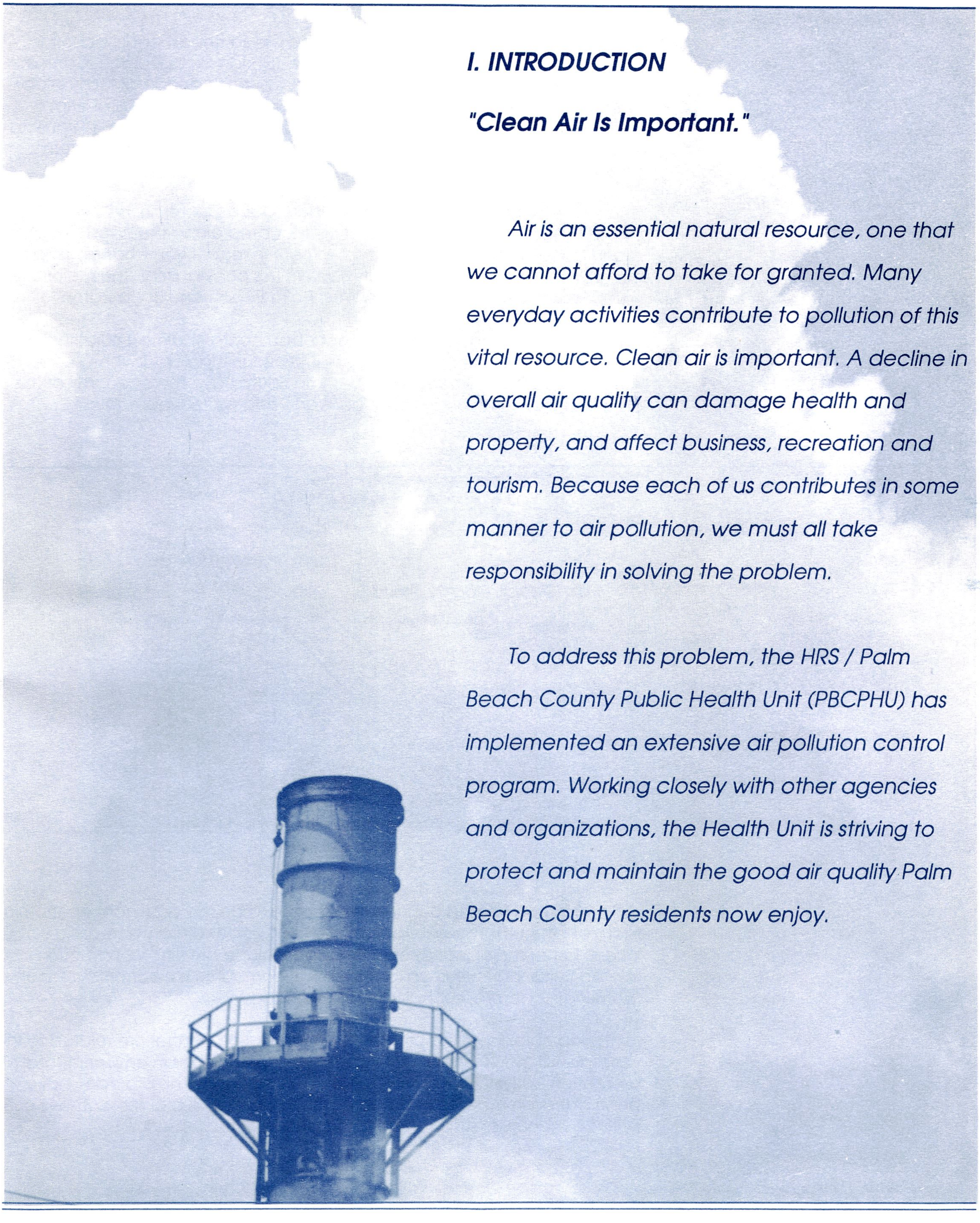
III. Air Quality Assessment 7
Meteorology 7
Ambient Air Monitoring 8
Carbon Monoxide 9
Nitrogen Dioxide 9
Ozone 9
Particulate Matter 11
Sulfur Dioxide 11
Air Quality Index 11
Pollen & Mold Spore Count 12
Air Quality Index Charts 13

IV. Sources of Air Pollution 14
Stationary Sources 14
Mobile Sources 15
Area Sources 15
Emission Inventory 15

V. Air Pollution Control Activities................. 17
Permitting 17
Inspection & Compliance 17
Complaints 18
Enforcement 18
Mobile Source Activities 18
Asbestos 19
Open Burning 19
Indoor Air Section 19

Public Information 20

New Developments 20



I. INTRODUCTION

"Clean Air Is Important."

Air is an essential natural resource, one that we cannot afford to take for granted. Many everyday activities contribute to pollution of this vital resource. Clean air is important. A decline in overall air quality can damage health and property, and affect business, recreation and tourism. Because each of us contributes in some manner to air pollution, we must all take responsibility in solving the problem.

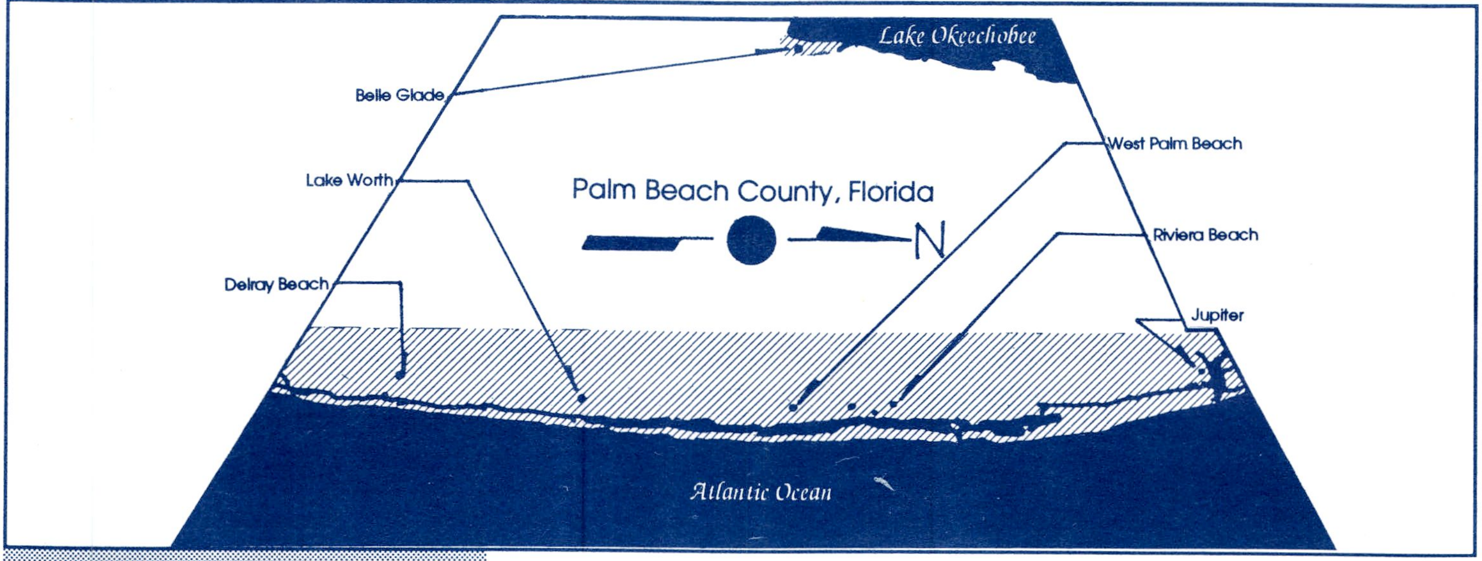
To address this problem, the HRS / Palm Beach County Public Health Unit (PBCPHU) has implemented an extensive air pollution control program. Working closely with other agencies and organizations, the Health Unit is striving to protect and maintain the good air quality Palm Beach County residents now enjoy.

Characteristics of Palm Beach County

Palm Beach County is located along the southeast coast of Florida, and is part of what is generally called the "Florida Gold Coast". Containing about 2000 square miles, Palm Beach County is geographically separated into two regions. One region is a highly urbanized coastal strip, stretching approximately forty-five (45) miles north to south, from Tequesta to Boca Raton. The other region is agricultural, located in the western portion of Palm Beach County (the Glades Area).

The estimated population of Palm Beach County in 1990 was 849,407. About 90% of the population is located along the coast, reaching inland about 15 miles. Rapid development in recent years has resulted in the growth of several municipalities within this coastal strip. The major cities with populations over 50,000 are West Palm Beach and Boca Raton.

The area around Lake Okeechobee contains almost all of the remaining 10% of the county's population. Municipalities in the Glades Area include Belle Glade, Pahokee, and South Bay. The economy of this area is agricultural, based on sugar cane and winter vegetables.



Tourism and related businesses continue to be the dominant economic factors in the urban area. Tourism has kept pace with an increasing population. Other major industries in the area include building construction and related fields, agriculture, aircraft testing, computer & electronics manufacturing, concrete, asphalt and service industries.

The complexity of the problems of air pollution control are related to the widespread growth in Palm Beach County. Advances in environmental protection activities, which are being carried out by this program, have been utilized in order to keep abreast of air pollution problems. These activities are characteristic of urban areas across the nation.

Jim Stormer, Administrator
of the Air Pollution Control Section

Organization and Goals

The air pollution control program is organized under the HRS/Palm Beach County Public Health Unit's Division of Environmental Science and Engineering. Established in 1968, it is one of the oldest and most experienced programs in the state. Operating on behalf of Palm Beach County, the Health Unit's program is recognized by the Florida Department of Environmental Regulation as an approved local air program. The program is supported by general revenue funds, a federal grant, and motor vehicle registration fees.

The goals and objectives of the Health Unit's air program include:

- *Attain and maintain National Ambient Air Quality Standards.*
- *Protect public health, safety and welfare.*
- *Promote air quality preservation and the conservation of our natural resources.*

To meet these goals, the air pollution control program is organized in two general areas: air pollution control and air quality assessment. Given sufficient resources, adequate regulations and, most importantly, the support of the public, these goals and objectives can be achieved.

II. MAJOR AIR POLLUTANTS & HEALTH EFFECTS

A number of air pollutants can cause damage to our health. The Clean Air Act provides for the establishment of National Ambient Air Quality Standards (NAAQS) for a select list of air pollutants. These "criteria" air pollutants are the most prevalent and have the greatest overall adverse impacts on health. The standards are designed to protect public health with a margin of safety, and are based on the best available scientific evidence. Table **II. 1** lists the current ambient air quality standards for the six criteria air pollutants and a description of each pollutant follows.

AMBIENT AIR QUALITY STANDARDS

POLLUTANT	UNITS	FEDERAL PRIMARY	FEDERAL SECONDARY	STATE
INHALABLE PARTICULATE MATTER (PM10)				
Annual Arithmetic Mean	µg/m3	50	—	Same
Maximum 24 Hour Concentration	µg/m3	150	—	Same
SULPHUR OXIDES				
Annual Arithmetic Mean	µg/m3	80	—	60
	PPM	0.03	—	0.02
Maximum 24 Hour Concentration	µg/m3	365	—	260
	PPM	0.14	—	0.10
Maximum 3 Hour Concentration	µg/m3	—	1300	Same
	PPM	—	0.50	Same
CARBON MONOXIDE				
Maximum 8 Hour Concentration	mg/m3	10	Same	Same
	PPM	9	Same	Same
Maximum 1 Hour Concentration	mg/m3	40	—	Same
	PPM	35	—	Same
OZONE				
Daily Maximum 1Hour Concentration	mg/m3	235	Same	Same
	PPM	0.12	Same	Same
NITROGEN OXIDES				
Annual Arithmetic Mean	µg/m3	100	Same	Same
	PPM	0.05	Same	Same
Lead				
3 Month Average	µg/m3	1.5	Same	Same

Table II.1

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless and tasteless gas. It is formed during combustion processes whereby carbon containing fuel is partially oxidized to carbon monoxide rather than carbon dioxide (CO_2). The major source of carbon monoxide (90%) is from motor vehicle emissions.

Carbon monoxide is toxic because it combines with hemoglobin in the blood that transports oxygen to cell tissues. Carbon monoxide has 210 times the affinity for hemoglobin than oxygen, and remains more tightly bound. Because it competes with oxygen, it can seriously interfere with the transport of oxygen throughout the body. The amount of carbon monoxide that combines with hemoglobin is dependent upon the concentration of carbon monoxide in the air and the length of exposure. Concentrations in excess of 750 parts per million can cause death by asphyxiation.

Exposure to ambient levels exceeding the standard can effect the central nervous system as a result of reduced oxygen levels in the brain. Effects include impairment in the ability to estimate time intervals, discriminate brightness and react to visual stimuli.

Individuals suffering from anemia or a cardiovascular disease, such as emphysema, are more likely to be affected by carbon monoxide. Cigarette smokers, and those exposed to environmental tobacco smoke, are also more susceptible to the effects of carbon monoxide. This is a result of the environmental exposure adding to the already high residual CO levels in the blood due to cigarette smoking.

Lead

Until recently, the major source of lead in the atmosphere was from automobiles using gasoline containing lead. However, the use of lead compounds as gasoline additives is being phased out, with a complete ban to take effect in 1994. Another contributing source of lead emissions in Palm Beach County is a municipal waste combustor.

Airborne lead can enter the body through inhalation, ingestion of food goods, or drinking water contaminated with lead particle deposits. Once entering the body, lead can be absorbed in the blood stream and distributed throughout the body where its toxic effects can cause damage. The most sensitive organs and systems are the blood, the brain and nervous system, the kidneys, and the reproductive system.

Young children are particularly at risk because the adverse health effects occur at lower lead levels than for adults. Moreover, children are more likely to be exposed through ingestion of soils and dust containing lead as a result of play activities in a heavily urbanized or industrialized setting. Studies have documented that learning disabilities and lowered IQs can occur in children having elevated lead levels in the blood.

Nitrogen Oxides

The atmosphere is made up of about 78% nitrogen and 21% oxygen. During combustion under high temperatures and pressures (e.g., automobile engines and electric utility plants) these two elements combine to form nitrogen oxides. From an air pollution standpoint, the two compounds of major concern are nitric oxide and nitrogen dioxide.

Nitric oxide (NO) is a colorless and odorless gas. It is relatively non-irritating, and at ambient level does not pose a health threat. However, NO can be oxidized in the atmosphere through photo-chemical reactions to form nitrogen dioxide which is a health concern.

Nitrogen dioxide (NO_2) is a reddish-brown gas that is considered toxic. At elevated levels above ambient conditions, it can cause damage to the respiratory system and aggravate respiratory infections.

Nitrogen oxides can also contribute to acid rain. However, the primary concern with nitrogen oxides is that they contribute to ozone formation. This leads to further increases in the creation of smog.

Ozone

Ozone is a highly reactive compound made up of three oxygen atoms (0_3). It is characterized by a pungent odor and faint bluish tint. As a strong oxidant, it is one of the more toxic regulated air pollutants. Ozone also causes damage to vegetation, crops, and materials (especially those containing plastics and rubber).

Ozone is not directly released into the atmosphere, but is formed from the photo-chemical reactions of volatile organic compounds (VOC) and nitrogen oxides (NOx) in the presence of sunlight. It is the principal pollutant in smog. Because ozone formation is dependent upon sunlight, the highest concentrations occur typically in the early afternoon, from May through September. Currently, Palm Beach County is designated as being non-attainment with the NAAQS for the pollutant ozone.

Ground level ozone which is harmful should not be confused with the beneficial ozone in the earth's ozone layer. The ozone layer is in a level of the atmosphere called the stratosphere, located about 9 to 25 miles above the earth. It filters out harmful ultraviolet radiation from the sun (know to cause skin cancer), thereby shielding the earth's surface. Very little mixing occurs between the lower atmosphere and the stratosphere.

Ground level ozone has been shown to cause a number of physiological and pathological changes in both humans and animals. At concentrations exceeding the standard, it causes decreases in lung capicity. Adults participating in strenuous labor or rigorous physical exercise are particularly at risk. Symptoms include shortness of breath, chest pains or tightness, throat dryness, headache, and nausea. Also, asthmatics and those with pre-existing respiratory ailments may be more susceptible to attacks by ozone exposure.

There is also evidence that prolonged exposure to ozone will tend to retard lung clearance, and interfere with or inhibit the body's immune system. Research on the effects of chronic ozone exposure is ongoing.

Particulate Matter

Particulate matter is liquid or solid particles suspended in the atmosphere. Many natural sources contribute to suspended particulate matter such as soil, sand, mold spores, and pollens. Sources of man made particulate matter emissions include stationary fuel combustion, motor vehicle emissions, open burning, construction activities, and roadway traffic.

Particles that have an aerodynamic diameter of less than 10 micrometers (PM_{10}) are classified as "inhalable". This means that they can enter and be deposited in the respiratory system. In general, the smaller the particle, the more likely it can be deposited in the lower regions of the respiratory system. Deposition is also dependent on other physical and chemical characteristics of the particle.

Once a particle is deposited, the body's defense mechanism will attempt to clear it. Usually the deeper a particle is deposited in the respiratory system, the longer it will take to be cleared, and therefore, the longer the exposure to any toxic affect of the particle.

Exposure to high concentrations of particulate matter can contribute to the development of bronchitis and aggravate bronchial asthma. Children, smokers and individuals with pre-existing ailments are more likely to be susceptible. In the same manner, health impacts of particulate matter can be compounded with the synergistic effects of exposure to other pollutants such as sulfur dioxide.

Suspended particulate matter in the atmosphere also reduces visibility and can damage materials.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, non-flammable gas. At concentrations above 3 ppm the gas can be distinguished by its pungent irritating odor. Most sulfur dioxide emissions come from combustion sources, mainly power plants, burning fuels containing sulfur. When SO_2 is emitted into the air, it can combine with water to form sulfuric acid or other sulfate particles. It is also a major contributor to acid rain.

Sulfur dioxide primarily affects the upper respiratory system. It is usually removed by the nose, mouth and throat because of its solubility. Exposure to SO_2 can cause the bronchial tubes to constrict. Most individuals will be affected by SO_2 at concentrations of 5 ppm and above. However, some sensitive individuals, such as asthmatics, can show a response at concentrations as low as 0.25 ppm during vigorous exercise.

The overall health impacts of SO_2 are not limited to direct exposure to the gas. The health effects from exposure to sulfuric acid aerosols or other sulfate particles may be of greater consequence.

III. AIR QUALITY ASSESSMENT

Meteorology

Palm Beach County can be classified as a semi-tropical region. The near permanent position of the "subtropical" high pressure area dominates our weather. It causes the prevailing easterly surface winds and supplies the warm moist air necessary to produce the frequent evening rain showers and thunderstorms for which Southern Florida is known. The Atlantic Ocean borders the eastern edge of the county and the Gulf stream flows northward approximately three miles off-shore.

The subtropical high pressure area responsible for so much of the enjoyable weather in Palm Beach County is also capable of producing high pollution days. These days occur usually in December and January and result from cold northern air moving underneath the existing subtropical warm moist air. This results in a temperature inversion — an increase in temperature with height. In effect, this traps pollutants in the lower atmosphere near ground level.

Afternoon sea breezes control the daytime weather for the eastern part of the county. Fronts form along the boundaries between hot western land breezes and cool eastern sea breezes. A distinct line of cumulus clouds develops just ahead of the sea breeze fronts. The intense summer sun aids in the formation of thunderstorms along and ahead of these fronts. These storms tend to move westward toward the inland areas. Occasionally, cold northern fronts will push this far south to produce severe showers and thunderstorms when confronted with the local area's warm moist air.

The county's "rainy season" lasts from May to October and coincides with Hurricane Season from June to November. This wet weather is primarily due to the west-to-east movement of tropical weather systems from the Caribbean Sea and Atlantic Ocean. Dry northern winds may prevent this warm moist air from advancing farther north and lead to local area droughts. These winds may also help steer away most tropical cyclones. However, they can be overridden by strong southern winds and high pressure from the Atlantic which produces heavy rainfall.

Seldom does a cold air mass reach this region without being diminished by marine influences and our southern location. However, occasionally in December and January strong northern winds will push frigid continental air down into the Florida peninsula. This produces the region's coldest weather, usually found in the Glades Area. Frosts may occur if this weather persists for two to three days. The interior farmland receives a "freeze" about every third year.

1990 ANNUAL METEOROLOGICAL DATA
Palm Beach County

MONTH	1951-1980 MEAN MAXIMUM TEMP.	1990 DAILY MAXIMUM TEMP.	1951-1980 MEAN MINIMUM TEMP.	1990 DAILY MINIMUM TEMP.	1951-1980 MEAN MONTHLY PRECIP.	1990 ACTUAL MONTHLY RAINFALL	1990 PREVAILING WIND DIRECTION	1990 WIND SPEED
JANUARY	74.50	79.80	55.90	64.70	2.7	11.19	E	5.80
FEBRUARY	75.30	81.30	56.20	66.30	2.6	21.39	ESE	7.50
MARCH	79.30	80.50	60.80	65.90	2.69	1.91	E	8.30
APRIL	82.50	81.70	65.10	66.10	3.2	12.82	E	6.40
MAY	85.70	87.00	69.50	72.40	6.0	26.74	SE	7.00
JUNE	88.10	90.10	72.74	79.20	6.67	20.60	SE	5.10
JULY	89.70	91.20	74.20	75.40	6.06	10.17	ESE	3.70
AUGUST	90.10	92.40	74.80	75.00	5.78	6.60	SE	2.60
SEPTEMBER	88.40	90.20	74.30	75.20	9.29	11.70	E	4.80
OCTOBER	84.40	86.80	70.10	73.30	7.77	3.40	ENE	7.10
NOVEMBER	79.60	81.40	63.50	65.50	3.39	1.23	ENE	6.50
DECEMBER	75.70	79.10	58.20	63.40	2.26	1.94	E	5.60
	MEAN	MEAN	MEAN	MEAN	TOTAL	TOTAL	PREVAILING	MEAN
YEARLY	82.78	85.13	66.28	69.78	59.72	55.81	E	5.87

Table III.1 Palm Beach County 1990 meteorological data was compiled from information recorded at the Palm Beach International Airport (NWS).

Table III.1

Meteorological parameters play a significant role in understanding the overall air pollution cycle. Wind direction and speed are of primary importance — especially within the first few hundred feet of the surface in determining pollutant dispersion and movement. The wind direction indicates the pathway of the contaminants. The wind speed reflects the travel time to a receptor and is a factor of the dilution of a pollutant.

Other "high pollution" episodes may occur in summer, from April to October. One high pressure system may center over the Gulf of Mexico while a second settles just off the southeast Florida coast. These competing systems create light surface winds prohibiting the development of sea breezes which would normally dispense pollutants in the lower 100 feet of atmosphere. Also, lower than normal rainfall during this period can cause dry, dusty conditions. This, combined with intense summer sunlight and stagnating high pressure systems, can cause higher than normal ozone levels. Meteorological data for Palm Beach County in 1990 is shown in Table **III.1.**

Ambient Air Monitoring

One of the most important functions of the Health Unit's air program is to conduct ambient air monitoring. The data obtained is used to assess the overall air quality in Palm Beach County, and determines whether this area is in compliance with federal and state ambient air quality standards. Ambient air monitoring data is also used to evaluate the effectiveness of control strategies and the permitting program.

The monitoring is conducted throughout the county as indicated in Figure **III.2**, which identifies the location of the monitoring sites and the pollutants monitored. The monitoring is performed by employing highly trained and specialized staff utilizing state-of-the-art equipment. For the gaseous pollutants, sensitive instruments are used to detect in the sub parts per million range. These instruments run continuously except for calibration servicing or maintenance. The data collected from these instruments is stored on data loggers and is routinely telecommunicated via modem to the central data acquisition computer located in West Palm Beach. After the air monitoring data has been reviewed and validated, it is telecommunicated to the Florida Department of Environmental Regulation which then forwards it to the U.S. Environmental Protection Agency.

All ambient air monitoring is conducted in strict accordance with federal and state quality control limits and procedures. It is the responsibility of the air program's Quality Assurance Section to ensure that these requirements are met. A more detailed technical report of the Ambient Monitoring Section can be obtained by writing or calling the Health Unit.

Carbon Monoxide

The carbon monoxide monitoring station in West Palm Beach (site No.25) is located just south of Belvedere Road, a major arterial, and just north of Palm Beach International Airport. To determine maximum CO concentrations, the monitors are typically located near roadways as the major source of this pollutant is from motor vehicle emissions. Figure **III.3** indicates the maximum one-hour and eight hour concentrations for each month as compared to the respective standard. There have been no exceedances of the standards recorded in Palm Beach County.

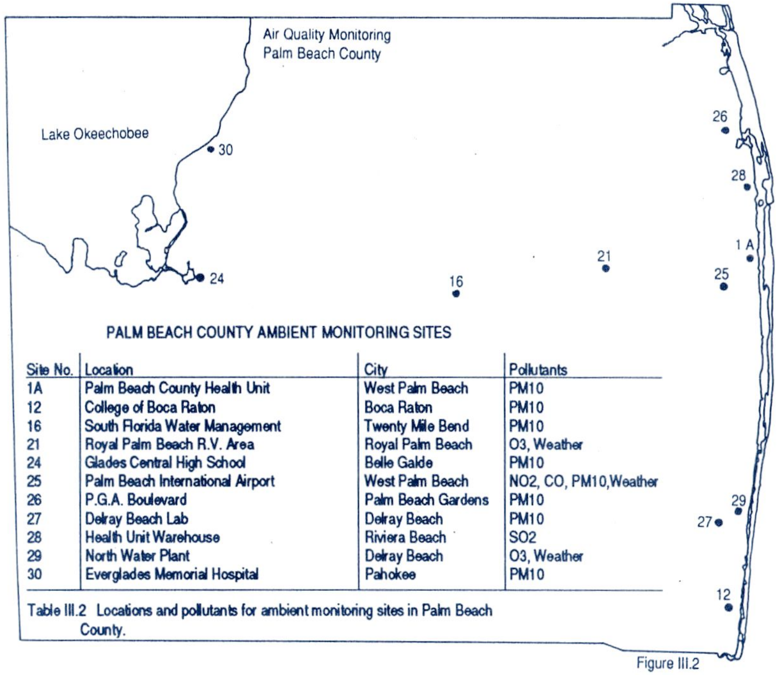
Highest CO concentrations usually occur on winter mornings. This coincides with peak traffic schedules, the coldest days, and weather conditions leading to a thermal inversion. Under these conditions, CO emissions are trapped near the ground, providing monitors with the highest readings.

Nitrogen Dioxide

Nitrogen dioxide is also measured at the West Palm Beach air monitoring station (site No. 25). Measured concentrations are all well within the air quality standards for this pollutant.

Ozone

Ozone monitoring is conducted in Royal Palm Beach (site No. 21) and in Delray Beach (site No. 29). These sites are designated as national air monitoring stations (NAMS). Figure **III.4** indicates the maximum hourly average concentrations for each month compared to the ozone standard of 0.120 parts per million. Highest ozone values typically occur in the late spring and summer months. Figure **III.5** identifies the highest ozone values recorded in Palm Beach County for the last 10 years. Although there have been no exceedances of the ozone standard for this period, Palm Beach County is designated as being non-attainment with the ozone standard. The Environmental Protection Agency has de-



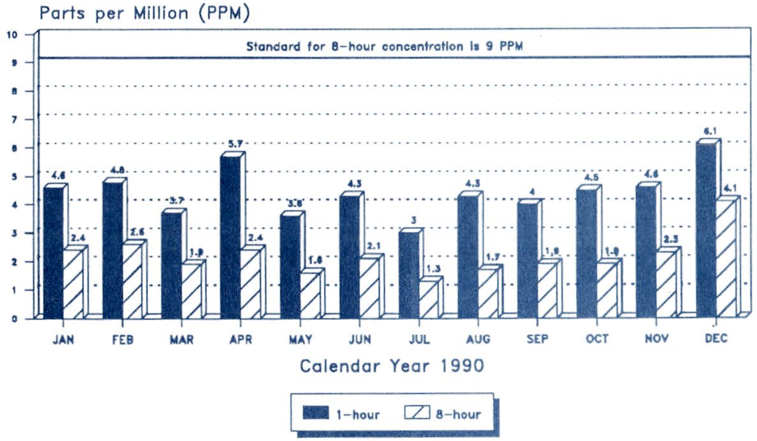
PALM BEACH COUNTY AMBIENT MONITORING SITES

Site No.	Location	City	Pollutants
1A	Palm Beach County Health Unit	West Palm Beach	PM10
12	College of Boca Raton	Boca Raton	PM10
16	South Florida Water Management	Twenty Mile Bend	PM10
21	Royal Palm Beach R.V. Area	Royal Palm Beach	03, Weather
24	Glades Central High School	Belle Galde	PM10
25	Palm Beach International Airport	West Palm Beach	NO2, CO, PM10,Weather
26	P.G.A. Boulevard	Palm Beach Gardens	PM10
27	Delray Beach Lab	Delray Beach	PM10
28	Health Unit Warehouse	Riviera Beach	SO2
29	North Water Plant	Delray Beach	03, Weather
30	Everglades Memorial Hospital	Pahokee	PM10

Table III.2 Locations and pollutants for ambient monitoring sites in Palm Beach County.

Figure III.2

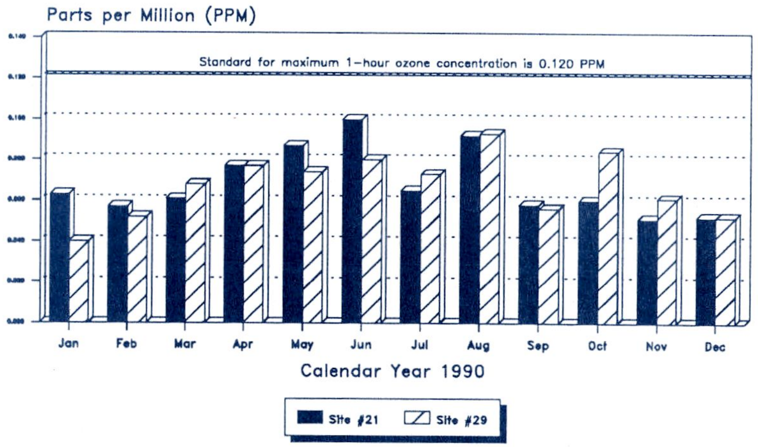
MAXIMUM CARBON MONOXIDE CONCENTRATIONS IN PALM BEACH COUNTY (SITE NO. 25)



Note: Standard for 1-hour is 35 PPM

Figure III.3

MAXIMUM MONTHLY OZONE CONCENTRATIONS IN PALM BEACH COUNTY



Site #21 is in Royal Palm Beach
Site #29 is in Delray Beach

Figure III.4

HIGHEST ANNUAL 1-HOUR OZONE CONCENTRATION FOR THE PAST TEN YEARS IN PALM BEACH COUNTY

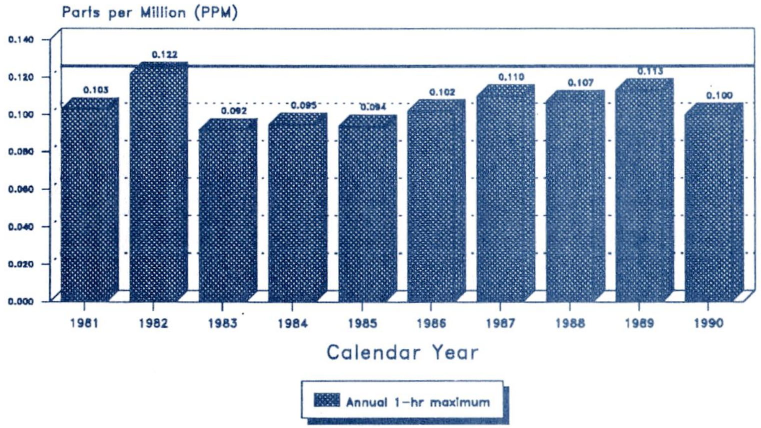


Figure III.5

termined that Dade, Broward and Palm Beach Counties are part of the same consolidated metropolitan statistical area (CMSA). The ozone levels have exceeded the standard in Dade and Broward counties.

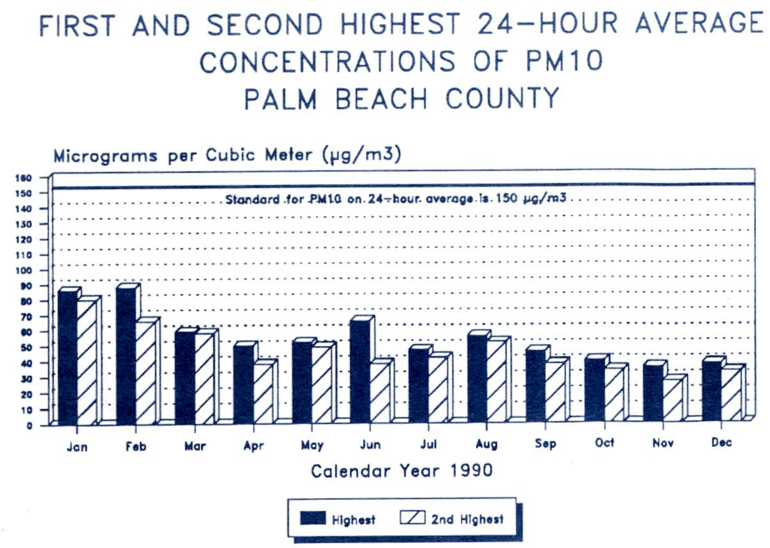


Figure III.6

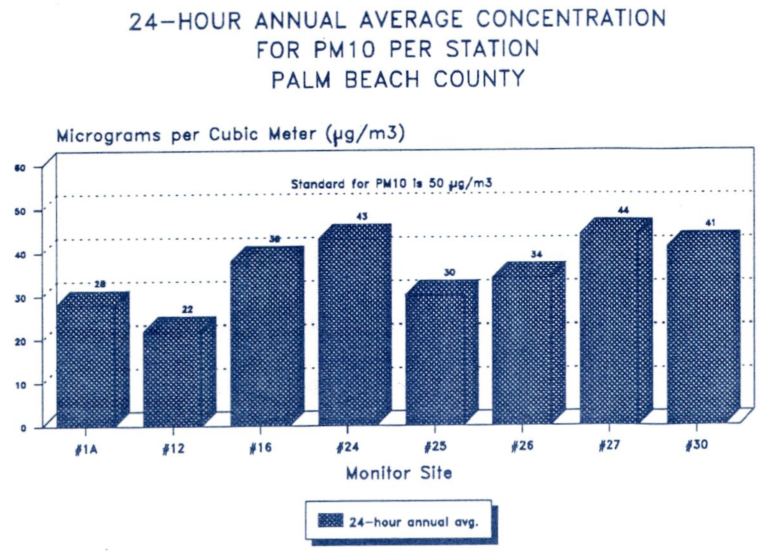


Figure III.7

Particulate Matter

Particulate matter is monitored employing high volume air samplers equipped with filters. These samplers operate for 24 hours every six days on a specific schedule. After each operation, the samplers are serviced and the filters replaced. The exposed filters are returned to the Environmental Chemistry Laboratory for analysis.

Prior to 1989, all samplers measured total suspended particulate (TSP). On May 30, 1988, the standards for total suspended particulate matter were rescinded and replaced by PM_{10}standards. PM_{10} is particulate matter with an aerodynamic diameter less than or equal to ten micrometers, which represents the inhalable fraction. Since the adoption of the new standard, the Health Unit has replaced TSP samplers with PM_{10} samplers which are equipped with inlets to exclude particles greater than 10µm. Any TSP remaining in the network during 1990 were considered as surrogate PM_{10} samplers.

In 1990, the Health Unit operated (8) particulate matter monitoring sites; six were designated as state and local air monitoring stations (SLAMS), and two as special purpose monitoring stations (SPM). **Figure III.6** indicates the highest and second highest 24 hour average value for each month with the corresponding station as compared to the standard of 150µg/m³. **Figure III.7** shows the 24 hour annual average for each station compared to the standard of 50µg/m³.

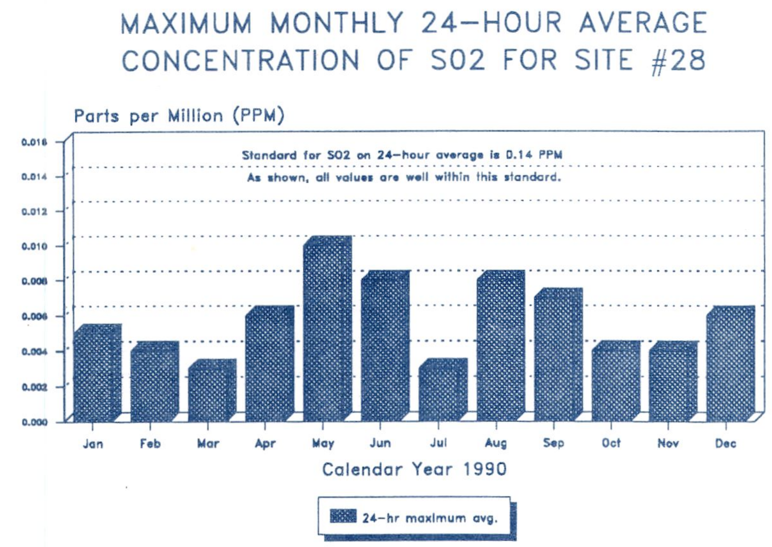
Particulate matter concentrations tend to be elevated during conditions of dry weather and heavy winds.

Sulfur Dioxide

Sulfur dioxide is monitored at one site located in Riviera Beach. This site is downwind of prevailing winds from the FP & L Riviera Power Plant which is the major sorce of SO_2 emissions in Palm Beach County. However, it can be seen by **Figures III.8** that measured SO_2 concentrations are well within ambient air quality standards. This pollutant is not of major concern in Palm Beach County.

Air Quality Index

The Air Quality Index (AQI) is a uniform method of reporting daily air pollution concentrations and the associated health effects. The index is



Site #28 is located in Riviera Beach.

Figure III.8

derived from the highest value of the five major pollutants monitored by the Health Unit: particulate matter, ozone, sulfure dioxide, oxides of nitrogen, and carbon monoxide. In Palm Beach County, particulate matter and ozone are the predominant pollutants. The AQI is based on the National Standard Scale spanning from 0-500 with a corresponding description range of :

1 - 50	GOOD
51 - 100	MODERATE
101 - 199	UNHEALTHY
200 - 299	VERY UNHEALTHY
300 - 500	HAZARDOUS

Air quality in Palm Beach County is in the GOOD range 90% of the time and in the MODERATE range less than 10 %. MODERATE air quality episodes of particulate matter may occur thoughout the year, usually the result of heavy construction activity and dry weather. Ozone levels approaching the MODERATE range usually occur during the afternoon hours of spring, summer, and fall. Stagnant weather conditions may also contribute to MODERATE level episodes.

For the latest update of Air Quality Index, call (407) 355-3962.

Pollen and Mold Spore Count

The HRS/PBCPHU also provides a pollen and mold spore count. The pollen count is given a numerical value based on the amount and type of pollen collected in a 24 hour period. Data is reported in "grains of pollen/mold spores per cubic meter of sampled air." This count is then compared to the following scale developed by the American Academy of Allergy and Immunology Aerobiology Committee:

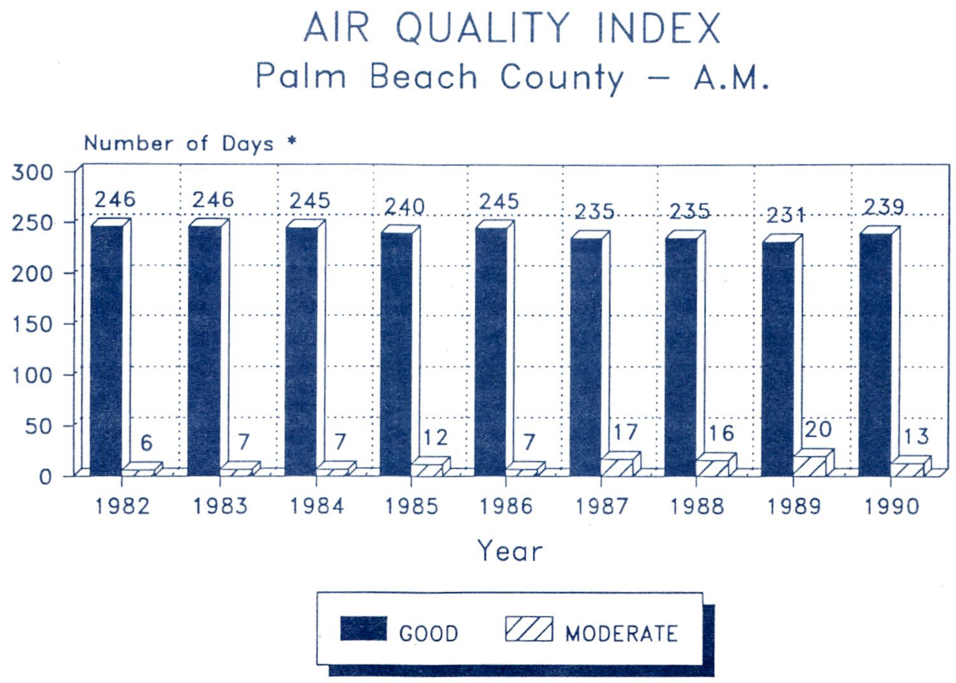
0-20	Low Count
20-200	Moderate Count
+200	High Count

There is no standard numerical scale for mold spores at this time. As new data becomes available, more meaningful scales can be developed and published. The instrument used to measure the pollen/mold spore count is called a "Roto-Rod Sampler" and is the standard sampling device.

Usually, the pollen count is higher in the spring through late summer, and lower in the fall through early spring. The mold spore count is effected by rainfall, generally increasing immediately after a storm and decreasing during dry periods. Palm Beach County receives the greatest amount of rainfall from late spring through fall.

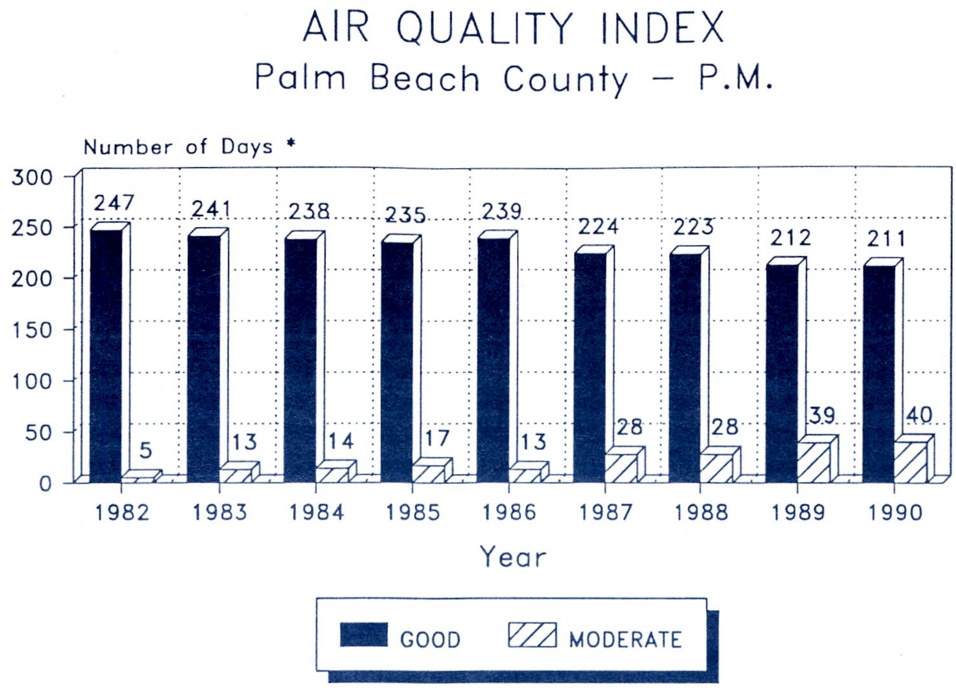
Figures III.9 & III.10, page 13, show the air quality index for A.M. & P.M. for Palm Beach County in 1990.

The HRS/PBCPHU updates the Air Quality Index and the Pollen/Mold spore Count daily at 11:00a.m. and 3:00 p.m. For the latest update, call (407) 355-3962.



** Excludes weekends and holidays.*

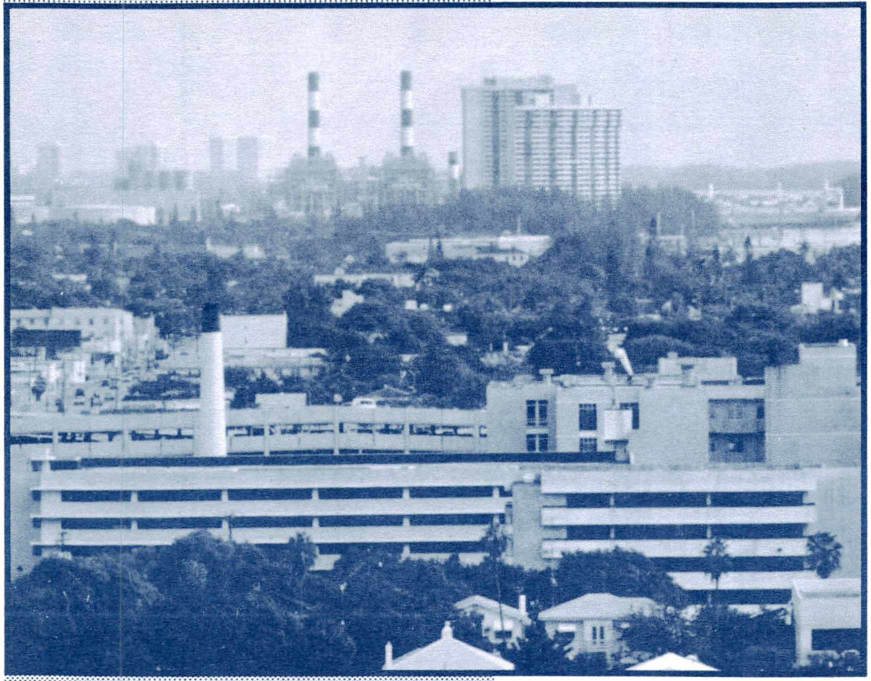
Figure III.9



** Excludes weekends and holidays.*

Figure III.10

IV. SOURCES OF AIR POLLUTION



Air pollution is primarily caused by man's industrial and transportation activities. It is the undesired byproduct of technological advancement of our modern society. On the other hand, modern society has also developed efficient methods to prevent and control atmospheric emissions of air pollutants. There are three categories of air pollution sources: stationary sources, mobile sources, and area sources.

Stationary Sources

The major stationary sources of air pollution are most often industrial and are usually characterized by smoke stacks. In eastern Palm Beach Beach County, the major stationary sources that emit over 100 tons of any one pollutant are: two electric power plants (FP & L Riviera Beach and Lake Worth Utilities) and a waste combustor (Solid Waste Authority North County Regional Resource Recovery Facility). In western Palm Beach County, the major stationary sources of air pollution are sugar mills. However, these mills only operate during the sugar cane harvesting season, which generally runs from October through March.

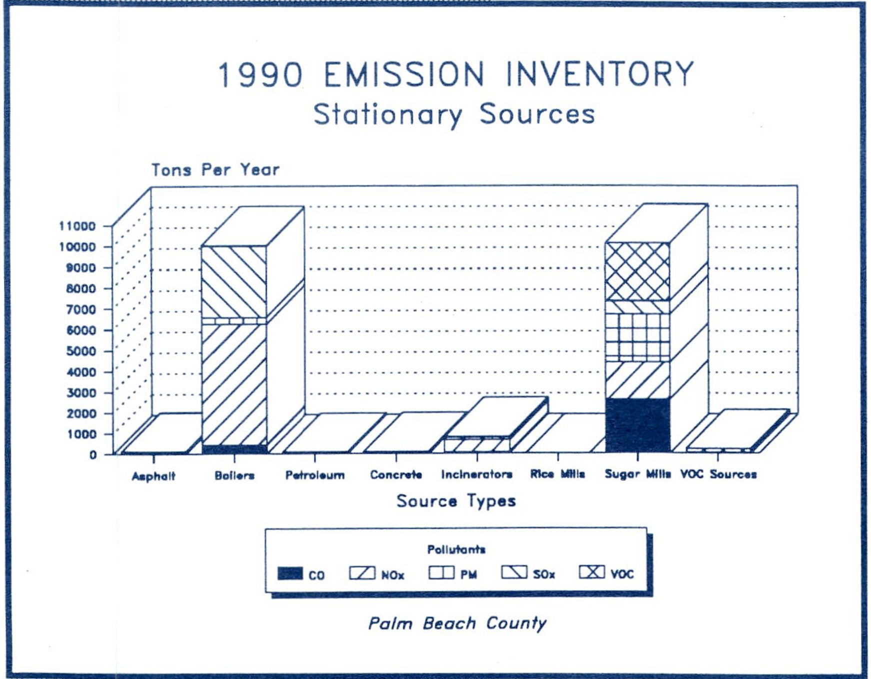


Figure IV.1

Other significant stationary sources involving combustion processes include biomedical waste incinerators, asphalt plants and commercial or industrial boilers. Several source categories have significant emissions of volatile organic compounds (VOC). These include bulk gasoline plants, miscellaneous metal coating operations, polyester resin (fiberglass) fabrication and electronic manufacturing. A major aircraft testing and manufacturing facility located in Palm Beach County (United Technologies) also emits significant quantities of VOC. Stationary sources of particulate matter include two portland cement terminals and numerous concrete batch plants.

Stationary sources generally reduce the amount of pollutants released into the ambient air through the installation of control equipment. Emissions can also be reduced through process changes which provide for more efficient operations, or by using cleaner fuels and alternate coatings and solvents. **Figure IV.1** shows the contributions of air pollution by source type.

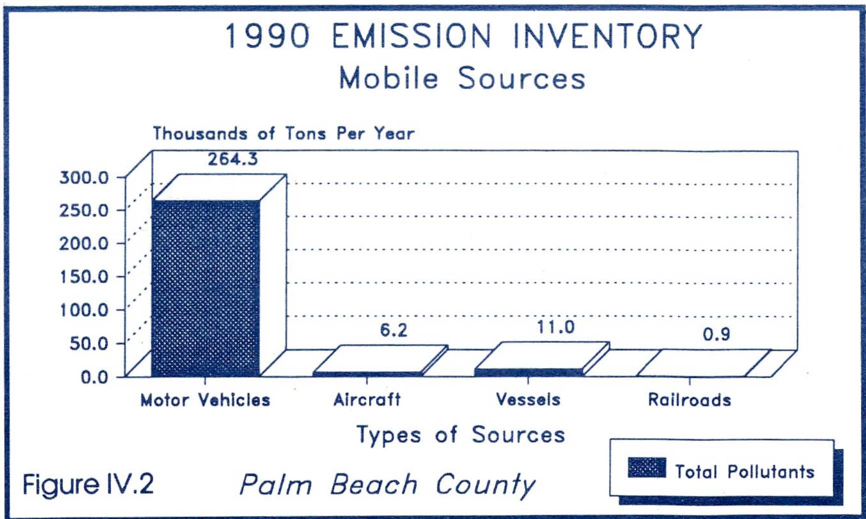


Figure IV.2

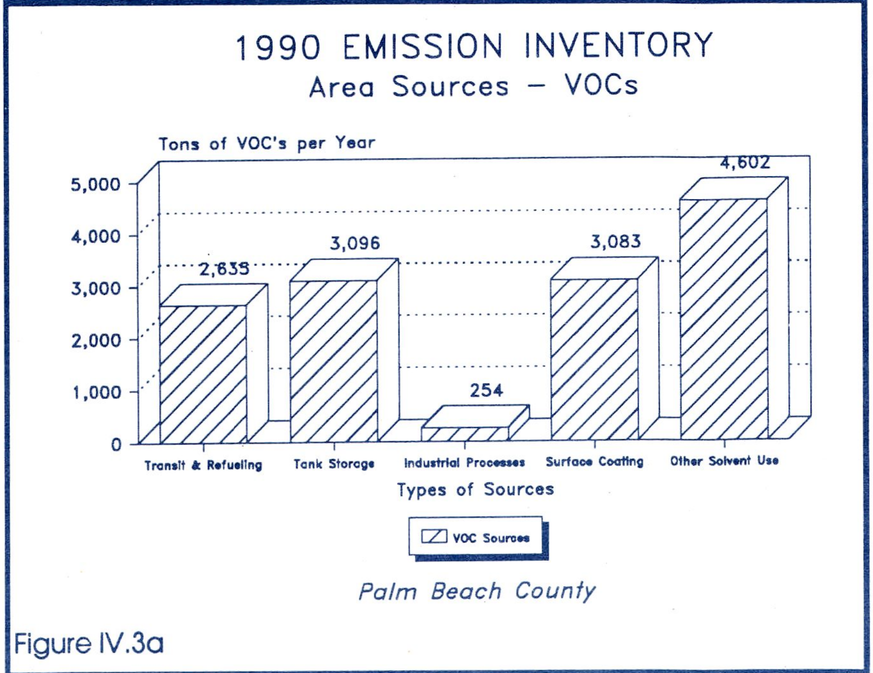


Figure IV.3a

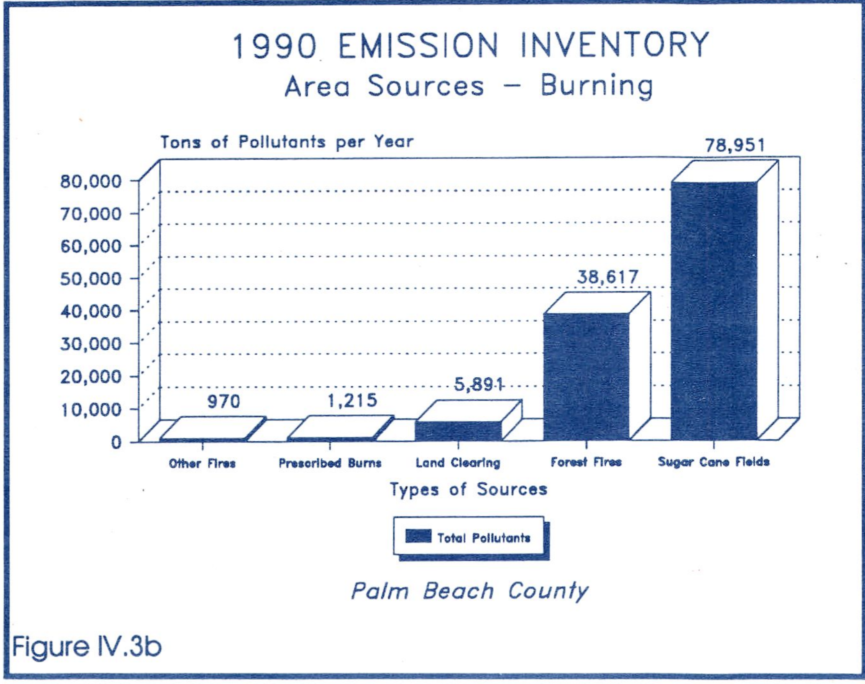


Figure IV.3b

Mobile Sources

Mobile sources such as cars, planes, trains and boats are the major contributors to our region's air pollution problems. Emissions from mobile sources, (mainly light duty gasoline powered vehicles), contribute about 70% of the precursors of ozone formation. The large number of vehicles, both automobiles and trucks, is creating a burden on the existing transportation network, thereby making control of these sources very difficult. More fuel efficient vehicles and those operating on clean fuels (hydrogen, compressed natural gas, and electricity) also reduce air pollution. Figure IV.2 shows the contributions of air pollution for each mobile source type.

Mobile source pollution can also be reduced by providing a transportation network that minimizes congestion, and reduces the number of vehicle miles traveled (VMT) by developing and improving utilization of mass transit systems. The Tri County Commuter Rail (a commuter train that runs 67 miles between West Palm Beach and Miami) is a good example of a "transportation control measure" (TCM) to reduce VMT. Car and van pooling, flexible/staggered work hours, and preferential treatment for high occupancy vehicles are examples of other TCMs.

Area Sources

Area sources are geographic localities with pollution problems stemming from the combined effects of various activities. Palm Beach County has many sources that emit small quantities of air pollutants; collectively their impact is significant. This includes point sources which are too small and /or too numerous to be surveyed and characterized individually. Dry cleaners, gasoline stations, open burning of land clearing debris, consumer solvents, architectural coatings, and dust from construction activities are just a few examples of area sources. Figure IV.3a shows pollution contributions for VOC sources and Figure IV.3b shows pollution contributions for sources of burning.

Emission Inventory

A comprehensive emission inventory is an essential tool for any air pollution regulatory agency. The inventory provides information for the design of an ambient air monitoring program, identifies the relative contribution of the various pollution sources, and provides data for the development of control strategies and regional planning. A number of factors are used in compiling an emission inventory including fuel usage figures, process information, and accepted emission factors. Although the methods and factors are somewhat limited in preciseness, the emission inventory nevertheless provides sufficient accuracy for the purpose and intent. The emission inventory in this report represents calculated emissions from major stationary point sources, and generalized estimates of emissions from mobile sources and area sources (Tables IV.4, IV.5, and IV.6 respectively).

1990 EMISSION INVENTORY
Stationary Sources
Palm Beach County

CATEGORY	SOURCE NAME	POLLUTANTS - Tons per Year					
		CO	NOx	PM	SOx	VOC	TOTAL
Agricultural Sources	Miscellaneous	0.00	0.00	4.02	0.00	0.00	4.02
Asphalt Plants	Sub-totals	10.96	10.38	5.78	88.52	8.09	123.73
	Parkway Asphalt	3.53	3.34	1.86	54.22	2.60	65.55
	Ranger Construction #125	2.88	2.73	1.52	13.30	2.13	22.56
	Ranger Construction #129	4.55	4.31	2.40	21.00	3.36	35.62
Boilers - Power Generation	Sub-totals	450.09	5812.50	322.78	3412.43	30.04	10027.83
	FPL - Riviera Beach	414.75	5665.04	315.93	3345.53	27.15	9768.40
	Lake Worth Utilities	34.58	141.53	5.90	30.83	2.76	215.60
	Miscellaneous	0.76	5.93	0.97	36.06	0.11	43.83
Bulk Petroleum							
	Storage Industry Miscellaneous	0.00	0.00	0.00	0.00	88.82	88.82
	Concrete Industry Miscellaneous	0.00	0.00	99.56	0.00	0.00	99.56
Incinerators	Sub-totals	70.37	582.48	51.64	128.59	23.40	856.48
	Biomedical	12.26	27.31	34.81	2.81	2.89	80.08
	Solid Waste Authority	41.51	545.57	3.84	113.65	15.77	720.34
	Miscellaneous	16.60	9.60	12.99	12.13	4.74	56.06
Sugar Mills	Sub-totals	2623.92	1764.25	2303.85	648.78	2771.03	10111.84
	Atlantic Sugar	281.60	176.89	275.98	23.93	280.88	1039.27
	Okeelanta Corp.	624.50	425.12	466.08	380.57	619.93	2516.91
	Osceola Farms	404.27	266.93	404.89	176.58	402.05	1654.72
	Sugar Cane Grower's COOP	358.30	317.63	578.19	27.26	513.50	1794.88
	Talisman Sugar	322.10	194.53	295.23	17.83	321.80	1151.49
	U.S. Sugar	633.15	383.16	279.46	22.62	632.86	1951.24
VOC Sources	Sub-totals	7.45	27.12	3.88	10.36	184.10	232.91
	Pratt & Whitney	5.17	21.64	3.78	9.83	57.73	98.13
	Miscellaneous	2.28	5.48	0.10	0.53	126.37	134.75
Palm Beach County	1990 Pollutant Totals	3162.79	8196.73	2791.51	4288.68	3105.48	21545.19

TABLE IV.4 1990 Emission Inventory for Palm Beach County listing
Tons of Pollutant for various stationary sources.

1990 EMISSION INVENTORY
Mobile Sources
Palm Beach County

	POLLUTANTS - Tons per Year					
	CO	NOx	PM	SOx	VOC	TOTAL
Mobile Sources						
Motor Vehicles	197,027	25,587	2017	1335	38,350	264,316
Aircraft	5,229	500	16	54	445	6,244
Vessels	7,958	284	25	230	2,457	10,954
Railroads	174	521	33	76	123	927
1990 Pollutant Totals	210,388	26,892	2,091	1,695	41,375	282,442

Table IV.5 1990 Emission Inventory for Palm Beach County listing
Tons of Pollutant for various mobile sources.

1990 EMISSION INVENTORY
Area Sources
Palm Beach County

CATEGORY	SOURCE NAME	POLLUTANTS - Tons per Year					
		CO	NOx	PM	SOx	VOC	TOTAL
Area Sources (VOCs)	Sub-Totals	0	0	0	0	13,670	13,670
	Tanker Trucks (in transit)	0	0	0	0	197	197
	Tanker Unloading, Stage 1	0	0	0	0	102	102
	Underground Tanks	0	0	0	0	91	91
	Vehicle Refueling, Stage II	0	0	0	0	2,336	2,336
	Industrial Processes	0	0	0	0	254	254
	Industrial Surface Coating	0	0	0	0	129	129
	Non-Industrial Surface Coating	0	0	0	0	2,954	2,954
	Petroleum Storage	0	0	0	0	3,005	3,005
	Other Solvent Use	0	0	0	0	4,602	4,602
(BURNING)	Sub-Totals	101,240	1,057	11,051	2	12,295	125,645
	Auto Fires	0.6	0.02	0.5	0	0.2	1.3
	Bush and Refuge	585	17	71	0	79	752
	Com./Res. Land Clearing	4,582	131	556	0	622	5,891
	Dupree Reserve	630	18	77	0	86	811
	House Fires	145	24	27	2	19	217
	Prescribed Burns	945	27	115	0	128	1,215
	Sugar Cane Fields	64,948	0	6,633	0	7,370	78,951
	Wild Fires	29,404	840	3,571	0	3,991	37,806
	1990 Pollutant Totals	101,240	1,057	11,051	2	25,965	139,315

TABLE IV.6 1990 Emission Inventory for Palm Beach County listing
Tons of Pollutants for various area sources.

V. AIR POLLUTION CONTROL ACTIVITIES

The Air Pollution Control Section of the HRS / Palm Beach County Public Health Unit is responsible for permit review, stationary source inspections, enforcement, mobile source program, asbestos tracking, indoor and outdoor air pollution, air pollution complaints, and open burn approvals. Each of these programs are described below. See table V.1 for the activity summary of each component.

Palm Beach County
Air Pollution Control Section
1990 Activities Summary

AIR POLLUTION PERMIT REVIEW	
Construction Permits	31
Operating Permits	31
STATIONARY SOURCE INSPECTIONS	
Major	53
Minor	55
ENFORCEMENT	
Notice of Violations	35
Environmental Control Hearing Board Cases	12
Money Collected	$ 4000
Consent Orders	12
Money Collected	$ 38,625
MOBILE SOURCE PROGRAM	
Inspections	
Stage I Vapor Recovery, Facility	52
Stage I Vapor Recovery, Delivery	31
Emission Testing	26
Presentaions	49
Investigations	1
Review	
Stage I Vapor Recovery Plans	21
Development of Regional Impact (DRI)	15
ASBESTOS	
Notifications	352
Demolitions	164
Approvals	61
Inspections	319
Non-Inspections	4
Deferrals	18
Percent Completed	99.6%
COMPLAINTS.	495
Odor	73
Smoke/Open Burning	138
Noise	16
Dust	80
Paint Overspray/Chemical Fumes	63
Asbestos	8
Indoor Air Section	117
OPEN BURN APPROVALS.	253
Commercial	152
Residential.	101

TABLE V.1 1990 Activity Summary of the Air Pollution Control Section of the Palm Beach County Public Health Unit.

Table V.1

Permitting

Large stationary sources of air pollution are required to obtain permits from the Florida Department of Environmental Regulation (FDER). Copies of permit applications, renewals, and modifications are sent to the Health Unit. Here, the air pollution control staff reviews current state and federal environmental regulations. Comments and recommendations are forwarded to FDER. If issued, a permit then becomes a legal agreement between the pollution source and the state concerning equipment, materials, processing, operation and air pollution emissions.

Inspection and Compliance

Field compliance inspections are performed to insure adherence to permit conditions and environmental regulations. There are three main types of inspections.

Annual Facility Inspections are performed each year for all permitted sources in Palm Beach County. These inspections include a physical tour of the facility emphasizing stack emissions, air pollution control equipment, fuel usage, fugitive emissions, record keeping and general facility conditions. The operating permit is reviewed and notes are made of any equipment, material, or process changes made during the past year.

Compliance Stack Tests are required by some permits to verify that a facility is in compliance with the permit's specific conditions on emission limits. Palm Beach County inspectors witness all stack tests to insure that standard test procedures are followed.

Complaint Response Inspections are performed to determine whether a facility is responsible for causing a public complaint. Stack and fugitive emissions are observed. If a complaint is valid, an inspector may perform a detailed inspection to find the cause of the excess emissions. This may involve many of the same procedures used for an annual facility inspection.

Inspection reports are added to the source files which contain permit, compliance, complaint, and enforcement information. Inspections are also logged into the DER's computerized database. Unsatisfactory inspections would lead to some level of enforcement action.

Complaints

Perhaps the most important function of the Air Pollution Control Section is to respond to citizens' complaints. This provides a direct service to the public and alerts the Health Unit to problem areas. It is a policy that all air pollution complaints be investigated in a timely manner and resolved or referred to the appropriate party. The Air Pollution Control Section staff responds to numerous complaints throughout the year including smoke, dust, odors, noise, asbestos, chemical fumes, and paint/pesticide overspray.

Enforcement

A key element for successful compliance is a good enforcement program. Sources found out of compliance with permit conditions or state air regulations can be brought before the Palm Beach County Environmental Control Hearing Board. This board is a quasi-judicial regulation body established by the Palm Beach County Environmental Control Act. The board holds public hearings for cases of non-compliance with environmental regulations. Alternatively, Florida Statutes allow approved local programs, such as the Health Unit's, to pursue civil penalties up to $10,000 per day per violation.

Mobile Source Program Activities

The Mobile Source Program is responsible for implementing regulations designed to control emissions from cars, trains, planes and boats — more commonly referred to as mobile sources. This is accomplished with regular inspections and aggressive enforcement by highly trained personnel. Used car lots, gasoline service stations, and gasoline delivery vessels are a few of the local sources subject to compliance activities. A comprehensive "Emissions Inventory" is compiled annually for mobile sources.

Other "indirect sources" are evaluated and monitored through the Development of Regional Impact (DRI) review process and coordinated with the Treasure Coast Regional Planning Council (TCRPC). These sources include any large scale development projects which would increase traffic and, indirectly, air pollution.

The Mobile Source Program is also very involved with the transportation planning process at the local level, holding membership in the Metropolitan Planning Organization's (MPO's) Technical Advisory Committee and Bicycle Advisory Committee and the statewide Transportation Control Measures (TCMs) Task Force.

The MPO is responsible for the long range transportation planning in the county. Planning efforts focus on promoting TCMs such as car and van pooling, flexible work hours, mass transit systems, public/private partnerships to increase urban mobility, and the integration of all modes of transportation. Many strategies are aimed at changing the individual's driving habits and decreasing single occupant vehicle trips. This will reduce the overall vehicle miles travelled, conserve fuel resources, reduce dependence on foreign oil and, ultimately, improve our air quality.

Asbestos

Asbestos exposure has been shown to cause a number of diseases including asbestosis, lung cancer and mesothelioma, a rare and usually fatal cancer. The health risks associated with asbestos has resulted in federal regulations contained in the National Emission Standards for Hazardous Air Pollutants (NESHAP). The HRS/Palm Beach County Public Health Unit is the lead agency for enforcing these regulations in Palm Beach County. The NESHAP regulations include notification requirements, and standards for the handling and disposal of asbestos containing materials. The Health Unit issues written approvals for asbestos abatement projects, and conducts inspections to ensure that all NESHAP requirements are being adhered to as well as other applicable federal and state regulations for this activity. The PBCPHU also routinely inspects buildings to verify that there will be no threat of asbestos fibers being released into the air during demolition activities.

Open Burning

In Palm Beach County, the open burning of vegetative debris is allowed for land clearing purposes. This activity is a one-time operation associated with clearing a property for the construction of a commercial business or private residence. To minimize the air pollution generated by this activity, the Health Unit inspects all commercial and residential land clearing open burn projects. After an inspector verifies that the proposed project will meet all applicable air pollution regulations, the Health Unit issues an approval letter. The approval letter is required by Palm Beach County Fire Rescue and the municipal fire departments in order to issue a burn permit for the construction site.

The Health Unit and the fire departments work closely together to monitor all open burning. Any project creating a nuisance or health threat will be suspended and enforcement action pursued.

Indoor Air Section

Recent energy conservation measures have resulted in efficient, well-insulated buildings and homes. Unfortunately, these measures also contribute to the build-up of many indoor air contaminants which may lead to illness such as "tight" or "sick" building syndromes. Occupants in such buildings may suffer from lethargy, headaches, stuffy noses, and irritations of the eyes and throat.

Most sources of indoor air pollution come from inside the building itself, for example:

- *Volatile Organic Compounds (VOCs) from new carpets, adhesives, and cleaning compounds*
- *Ozone from copying machines*
- *Formaldehyde vapors from insulation and particle boards*
- *Mildewcides (paraformaldehydes, camphor, and paradichlorobenzene)*

However, outside air can also play an important part in indoor air pollution, due to infiltration. Sources of outside air pollution include carbon monoxide from vehicle exhausts and hydrogen sulfide from sewer gas building exhausts. Many of these indoor air quality problems result from:

- *Inadequate ventilation*
- *Chemical contamination*
- *Bacterial and fungal contamination*

Regardless of the source or cause, high concentrations of these contaminants can pose a potential health threat. In response to this threat, the Health Unit established an Indoor Air Section within the Division of Environmental Health.

This section conducts surveys and investigations of all health-related complaints inside private homes and commercial buildings. Upon request, this program provides free consultation, air flow assessments, and environmental sampling to locate the air pollution source. It is then possible to identify suspected contaminants with a wide range of state-of-art equipment. Once the indoor air problem is identified, the Health Unit will provide recommendations or refer the client to other qualified agencies or experts.

Public Information

A Public Information Program (PIP) also exists within the HRS/Palm Beach County Public Health Unit to better inform the public and affected sources of compliance requirements and the dangers of air pollution. The focus of this program is on pollution prevention; establishing a "pro-active" approach rather than assuming a "reactive" posture. Presentations are routinely provided to businesses, automobile trade associations and even to local elementary school children. Whenever possible, arrangements are made with the local media/press to cover PIP activities during special events such as Clean Air Week, Car Care Month and annual Earth Day festivities. This year, agency personnel staffed an exibitor's booth for 18 days at the South Florida Fair.

New Developments

Mobile sources are responsible for about 70% of the county's Volatile

Organic Compounds (VOC) emissions. VOCs are the precursors primarily responsible for the formation of low-level ozone which leads to smog. In response to this statewide problem, the Florida Legislature passed the Clean Outdoor Air Law (COAL) in 1988. This law provided for three important measures:

- Establishment of the Motor Vehicle Inspection Program (MVIP)
- Prohibition of the operation or sale of tampered vehicles
- Prohibition of smoking vehicles

The MVIP is required in the six ozone non-attainment counties, including Palm Beach. It subjects vehicles, 1975 and newer, to annual tail pipe emissions testing as of April 1, 1991. The tampering and smoking regulations took effect January 1, 1990 and apply statewide. The Health Unit's Mobile Source Section was instrumental in the development of these programs. As members of the "MVIP Speakers Bureau", the staff routinely provided public presentations on preparation and compliance with the new law.

The major development in 1990 was the passage of the Clean Air Act Amendments (CAAA) in November. This comprehensive legislation will provide the framework for air pollution control into the next century. The CAAA establish new control strategies and time tables for areas still not meeting National Ambient Air Quality Standards. The amendments also go far beyond previous air legislation by providing regulations addressing air toxics, acid rain, and chlorofluorocarbons (partially responsible for the depletion of the ozone layer).

New challenges will face the Air Pollution Control Section of the Health Unit as a result of the CAAA. Many of these challenges involve the development and implementation of new air pollution control measures in Palm Beach County including:

- *Certification of automobile refrigerant recovery and recycling equipment*

- *Licensing of air conditioning service and repair facilities*

- *Regulations for the control of gasoline vapors during automobile refuelng (Stage II Vapor Recovery)*

- *Development of alternative fuels such as compressed natural gas, propane, hydrogen, and solar power*

- *Possible development of new standards for reformulated gaso line and tightening the automobile tail pipe emission standards*

It is with sincere hope and determination that the Air Pollution Control Section will strive to meet these new challenges and continue to protect South Florida's delicate air quality.

NOTES

Photo by:
Rick Hill

HRS / Palm Beach County Public Health Unit's Air Pollution Control Staff 1990.
From Left to Right
Front Row
Eric Peterson, Dennis Myers, Randy Miller, Ajaya Satyal
Second Row
Al Dudden, Linda Hudson, Jeff Koerner, Al Grasso, Cindy Dufffield, Sandy Nicholl, Walt Richards
Third Row
Andrew Smith, David Brown, Ken Bryson, Jim Stormer, Paul Kalamaras, Robert Berry

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Volunteer Services, 1991

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